

## CLAIMS

1. A cleaning gas for semiconductor production equipment, which is a cleaning gas for removing deposits in the equipment, comprising an inert gas and at least two gases selected from the group consisting of SF<sub>6</sub>, F<sub>2</sub>, and NF<sub>3</sub> excluding the combination of F<sub>2</sub> and NF<sub>3</sub> alone.
2. The cleaning gas for semiconductor production equipment as described in claim 1, comprising SF<sub>6</sub>, F<sub>2</sub>, and an inert gas.
3. The cleaning gas for semiconductor production equipment as described in claim 1, comprising SF<sub>6</sub>, NF<sub>3</sub>, and an inert gas.
4. The cleaning gas for semiconductor production equipment as described in claim 1, comprising SF<sub>6</sub>, F<sub>2</sub>, NF<sub>3</sub>, and an inert gas.
5. The cleaning gas for semiconductor production equipment as described in any one of claims 1 to 4, wherein the inert gas is at least one selected from the group consisting of He, Ne, Ar, Xe, Kr and N<sub>2</sub>.
6. The cleaning gas for semiconductor production equipment as described in claim 5, wherein the inert gas is at least one selected from the group consisting of He, Ar, and N<sub>2</sub>.
7. The cleaning gas for semiconductor production equipment as described in claim 1, wherein F<sub>2</sub> and/or NF<sub>3</sub> is from 0.01 to 5 and the inert gas is from 0.01 to 500

in terms of the volume ratio assuming that  $\text{SF}_6$  is 1.

8. The cleaning gas for semiconductor production equipment as described in claim 7, wherein  $\text{F}_2$  and/or  $\text{NF}_3$  is from 0.1 to 1.5 and the inert gas is from 0.1 to 30 in terms of the volume ratio assuming that  $\text{SF}_6$  is 1.

9. The cleaning gas for semiconductor production equipment as described in claim 1, which contains at least one gas selected from the group consisting of perfluorocarbon, hydrofluorocarbon, perfluoroether and hydrofluoroether.

10. The cleaning gas for semiconductor production equipment as described in claim 9, wherein the perfluorocarbon and hydrofluorocarbon each has from 1 to 4 carbon atoms and the perfluoroether and hydrofluoroether each has from 2 to 4 carbon atoms.

11. A cleaning gas for semiconductor production equipment, which is a gas for removing deposits in the equipment, comprising an oxygen-containing gas, an inert gas and at least two gases selected from the group consisting of  $\text{SF}_6$ ,  $\text{F}_2$ , and  $\text{NF}_3$  excluding the combination of  $\text{F}_2$  and  $\text{NF}_3$  alone.

12. The cleaning gas for semiconductor production equipment as described in claim 11, comprising an oxygen-containing gas, an inert gas,  $\text{SF}_6$ , and  $\text{F}_2$ .

13. The cleaning gas for semiconductor production equipment as described in claim 11, comprising an oxygen-containing gas, an inert gas,  $\text{SF}_6$ , and  $\text{NF}_3$ .

14. The cleaning gas for semiconductor production equipment as described in claim 11, comprising an oxygen-containing gas, an inert gas,  $\text{SF}_6$ ,  $\text{F}_2$  and  $\text{NF}_3$ .

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15. The cleaning gas for semiconductor production equipment as described in any one of claims 11 to 14, wherein the oxygen-containing gas is at least one selected from the group consisting of  $\text{O}_2$ ,  $\text{O}_3$ ,  $\text{N}_2\text{O}$ ,  $\text{NO}$ ,  $\text{NO}_2$ ,  $\text{CO}$  and  $\text{CO}_2$ .

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16. The cleaning gas for semiconductor production equipment as described in claim 15, wherein the oxygen-containing gas is  $\text{O}_2$  and/or  $\text{N}_2\text{O}$ .

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17. The cleaning gas for semiconductor production equipment as described in any one of claims 11 to 14, wherein the inert gas is at least one selected from the group consisting of  $\text{He}$ ,  $\text{Ne}$ ,  $\text{Ar}$ ,  $\text{Xe}$ ,  $\text{Kr}$  and  $\text{N}_2$ .

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18. The cleaning gas for semiconductor production equipment as described in claim 17, wherein the inert gas is at least one selected from the group consisting of  $\text{He}$ ,  $\text{Ar}$ , and  $\text{N}_2$ .

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19. The cleaning gas for semiconductor production equipment as described in claim 11, wherein  $\text{F}_2$  and/or  $\text{NF}_3$  is from 0.01 to 5, the oxygen-containing gas is from 0.01 to 5 and the inert gas is from 0.01 to 500 in terms of the volume ratio assuming that  $\text{SF}_6$  is 1.

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20. The cleaning gas for semiconductor production equipment as described in claim 19, wherein  $\text{F}_2$  and/or  $\text{NF}_3$

is from 0.1 to 1.5, the oxygen-containing gas is from 0.1 to 1.5 and the inert gas is from 0.1 to 30 in terms of the volume ratio assuming that SF<sub>6</sub> is 1.

5 21. The cleaning gas for semiconductor production equipment as described in claim 11, which contains at least one gas selected from the group consisting of perfluorocarbon, hydrofluorocarbon, perfluoroether and hydrofluoroether.

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22. The cleaning gas for semiconductor production equipment as described in claim 21, wherein the perfluorocarbon and hydrofluorocarbon each has from 1 to 4 carbon atoms and the perfluoroether and  
15 hydrofluoroether each has from 2 to 4 carbon atoms.

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23. A method for cleaning semiconductor production equipment, comprising use of the cleaning gas described in any one of claims 1 to 10.

24. The method for cleaning semiconductor production equipment as described in claim 23, wherein the cleaning gas described in any one of claims 1 to 10 is excited to produce plasma and the deposits in the semiconductor  
25 production equipment are removed in the plasma.

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25. The method for cleaning semiconductor production equipment as described in claim 24, wherein the excitation source for the plasma is a microwave.

26. The method for cleaning semiconductor production equipment as described in any one of claims 23 to 25, wherein the cleaning gas described in any one of claims 1

to 10 is used at a temperature range of 50 to 500°C.

27. The method for cleaning semiconductor production equipment as described in claim 23, wherein the cleaning  
5 gas described in any one of claims 1 to 10 is used at a temperature range of 200 to 500°C in a plasmaless system.

28. A method for cleaning semiconductor production equipment, comprising use of the cleaning gas described  
10 in any one of claims 11 to 22.

29. The method for cleaning semiconductor production equipment as described in claim 28, wherein the cleaning  
15 gas described in any one of claims 11 to 22 is excited to produce plasma and the deposits in the semiconductor production equipment are removed in the plasma.

30. The method for cleaning semiconductor production equipment as described in claim 29, wherein the  
20 excitation source for the plasma is a microwave

31 The method for cleaning semiconductor production equipment as described in any one of claims 28 to 30,  
wherein the cleaning gas described in any one of claims  
25 11 to 22 is used at a temperature range of 50 to 500°C.

32. The method for cleaning semiconductor production equipment as described in claim 28, wherein the cleaning  
30 gas described in any one of claims 11 to 22 is used at a temperature range of 200 to 500°C in a plasmaless system.

33. A method for producing a semiconductor device,

comprising a cleaning step of using a cleaning gas containing an inert gas and at least two gases selected from the group consisting of  $\text{SF}_6$ ,  $\text{F}_2$  and  $\text{NF}_3$  excluding the combination of  $\text{F}_2$  and  $\text{NF}_3$  alone, and a decomposition step  
5 of decomposing a fluorocompound-containing gas discharged from the cleaning step.

34. The method for producing a semiconductor device as described in claim 33, wherein the fluorocompound is at  
10 least one compound selected from the group consisting of  $\text{HF}$ ,  $\text{SiF}_4$ ,  $\text{SF}_6$ ,  $\text{SF}_4$ ,  $\text{SOF}_2$ ,  $\text{SO}_2\text{F}_2$ , and  $\text{WF}_6$ .

35. A method for producing a semiconductor device, comprising a cleaning step of using a cleaning gas  
15 containing an inert gas, an oxygen-containing gas and at least two gases selected from the group consisting of  $\text{SF}_6$ ,  $\text{NF}_3$  and  $\text{F}_2$  excluding the combination of  $\text{F}_2$  and  $\text{NF}_3$  alone, and a decomposition step of decomposing a fluorocompound-containing gas discharged from the cleaning step.

36. The method for producing a semiconductor device as described in claim 35, wherein the fluorocompound is at  
20 least one compound selected from the group consisting of  $\text{HF}$ ,  $\text{SiF}_4$ ,  $\text{SF}_6$ ,  $\text{SF}_4$ ,  $\text{SOF}_2$ ,  $\text{SO}_2\text{F}_2$ , and  $\text{WF}_6$ .

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